Test Procedure for §170.304 (i) Exchange clinical information and patient summary record

This document describes the draft test procedure for evaluating conformance of complete EHRs or EHR modules to the certification criteria defined in 45 CFR Part 170 Subpart C of the Interim Final Rule (IFR) as published in the Federal Register on January 13, 2010. The document is organized by test procedure and derived test requirements with traceability to the normative certification criteria as described in the Overview document located at http://healthcare.nist.gov/docs/TestProcedureOverview_v1.pdf. These test procedures will be updated to reflect the certification criteria defined in the ONC Final Rule.

Note: This test procedure is scoped only to the criteria defined in 45 CFR Part 170 Subpart C of the Interim Final Rule (IFR) as published in the Federal Register on January 13, 2010. This test procedure will be updated to reflect updates to the criteria and standards as published in the ONC Final Rule. Questions about the criteria and standards should be directed to ONC.

CERTIFICATION CRITERIA

§170.304 (i) Exchange clinical information and patient summary record.

(1) Electronically receive and display. Electronically receive a patient's summary record, from other providers and organizations including, at a minimum, diagnostic test results, problem list, medication list, medication allergy list, immunizations, and procedures in accordance with §170.205(a) and upon receipt of a patient summary record formatted in an alternate standard specified in §170.205(a)(1), display it in human readable format.

(2) Electronically transmit. Enable a user to electronically transmit a patient summary record to other providers and organizations including, at a minimum, diagnostic test results, problem list, medication list, medication allergy list, immunizations, and procedures in accordance with:

(i) One of the standards specified in §170.205(a)(1);

(ii) The standard specified in §170.205(a)(2)(i)(A), or, at a minimum, the version of the standard specified in §170.205(a)(2)(i)(B);

(iii)One of the standards specified in §170.205(a)(2)(ii);

(iv)At a minimum, the version of the standard specified in §170.205(a)(2)(iii);and

(v) The standard specified in §170.205(a)(2)(iv).

INFORMATIVE TEST DESCRIPTION

This section provides an informative description of how the test procedure is organized and conducted. It is not intended to provide normative statements of the certification requirements.

This test evaluates the capability for a Complete EHR or EHR Module[1] to send and receive patient summary records, including diagnostic test results, problem list, medication list, medication allergy list, immunizations, and procedures, in the formats and vocabularies specified by the referenced standards.

[1] Department of Health and Human Services, 45 CFR Part 170 Proposed Establishment of Certification Programs for Health Information Technology, Proposed Rule, March 10, 2010.

Per the IFR criteria, the test procedure does not evaluate the capability to send and receive other types of patient information in the patient summary record.

The test procedure is organized into two sections:

- Receive and Display - evaluates the capability to receive and display (render) a patient summary record in the EHR when received in HL7 CCD format and when received in ASTM CCR format. The patient summary record includes diagnostic test results, problem list, medication list, medication allergy list, immunizations, and procedures. Included in the test procedure is an evaluation of the capability of the EHR to display (render) structured data and vocabulary coded values in human-readable form
  - The Tester sends the NIST-supplied diagnostic test results, problem list, medication list, medication allergy list, immunizations, and procedures Test data formatted in HL7 CCD to the EHR
  - Using Vendor-identified EHR functions, the Tester displays the received CCD test data and validates that the rendered data is complete and presented in human readable format.
  - The Tester sends the NIST-supplied diagnostic test results, problem list, medication list, medication allergy list, immunizations, and procedures data formatted in ASTM CCR to the EHR
  - Using Vendor-identified EHR functions, the Tester displays the received CCR test data and validates that the rendered data is complete and presented in human readable format

  Per ONC guidance, the requirement for displaying structured data and vocabulary coded values in human readable form requires that the received XML (CCD or CCR) be rendered in some way which does not display the raw XML to the user. In addition, the standardized text associated with the vocabulary coded values must be displayed to the user. There is no requirement that the actual coded values be displayed to the user, however, the Vendor may choose to do so. The Vendor may also choose to display locally defined text descriptions of the vocabulary codes, however, the standardized text must always be displayed.

- Transmit – evaluates the capability to transmit a patient summary record from the EHR in either HL7 CCD or ASTM CCR format as selected by the Vendor. The patient summary record includes diagnostic test results, problem list, medication list, medication allergy list, immunizations, and procedures. Included in the test procedure is an evaluation of the capability to communicate vocabulary coded values as defined by the referenced standards
  - Using Vendor-identified functions, the Tester enters the NIST-supplied diagnostic test results, problem list, medication list, medication allergy list, immunizations, and procedures Test data into the EHR
  - The Tester transmits the Patient Summary Record from the EHR to a NIST test tool in the format selected by the Vendor (either HL7 CCD or ASTM CCR)
  - The Tester validates that the transmitted patient summary record is complete and in conformance

  Per ONC guidance, the standards referenced in the IFR specifically allow for the use of the HL7 CDA level 2 standard when the CCD is transmitted for this criteria. For this test procedure, the Vendor

may, at their discretion, transmit a conformant CDA Level 2 CCD, or a conformant CDA Level 3 CCD. If a CDA level 2 CCD is transmitted by the EHR, the NIST test tool will validate conformance with CDA level 2 CCD, and the Tester will visually inspect the received XML to verify that the correct patient data and vocabulary codes have been included. If a CDA level 3 CCD is transmitted, the NIST test tool will validate conformance with CDA level 3 CCD, and the Tester will visually inspect the received XML to verify that the correct patient data and vocabulary codes have been included. NIST will provide a link to an industry-supported style sheet which the Tester may use (not required) during the visual inspection.

REFERENCED STANDARDS

§170.205 Content exchange and vocabulary standards for exchanging electronic health information.	Regulatory Referenced Standard
(a) Patient Summary Record. (1) The Secretary adopts the following content exchange standards for the purposes of electronically exchanging a patient summary record or to use in creating an electronic copy of a patient summary record	
(i) Standard. Health Level Seven Clinical Document Architecture (CDA) Release 2, Level 2 Continuity of Care Document (CCD) (incorporated by reference in §170.299).	
(ii) Alternative standard. ASTM E2369 Standard Specification for Continuity of Care Record and Adjunct to ASTM E2369 (incorporated by reference in §170.299).	
(2) The Secretary adopts the following vocabulary standards for the purposes of specifying the code set, terminology, or nomenclature to use to represent health information included in a patient summary record:	
(i) Problem list	
(A) Standard. The code set specified for the conditions specified at 45 CFR 162.1002(a)(1).	45 CFR 162.1002(a)(1). (1) *International Classification of Diseases, 9th Edition, Clinical Modification, (ICD–9–CM), Volumes 1 and 2* (including The Official ICD–9–CM Guidelines for Coding and Reporting), as maintained and distributed by HHS, for the following conditions: (i) Diseases. (ii) Injuries. (iii) Impairments. (iv) Other health problems and their manifestations. (v) Causes of injury, disease, impairment, or other health problems.

§170.205 Content exchange and vocabulary standards for exchanging electronic health information.	Regulatory Referenced Standard
(B) Alternative standard. International Health Terminology Standards Development Organization (IHTSDO) Systematized Nomenclature of Medicine Clinical Terms (SNOMED CT®) July 2009 version (incorporated by reference in §170.299).	
(ii) Procedures	
(A) Standard. The code set specified at 45 CFR 162.1002(a)(2).	45 CFR 162.1002(a)(2). (2) *International Classification of Diseases, 9th Edition, Clinical Modification, Volume 3 Procedures* (including The Official ICD–9–CM Guidelines for Coding and Reporting), as maintained and distributed by HHS, for the following procedures or other actions taken for diseases, injuries, and impairments on hospital inpatients reported by hospitals: (i) Prevention. (ii) Diagnosis. (iii) Treatment. (iv) Management.
(B) Alternative standard. The code set specified at 45 CFR 162.1002(a)(5).	45 CFR 162.1002(a)(5). (5) The combination of *Health Care Financing Administration Common Procedure Coding System (HCPCS),* as maintained and distributed by HHS, and *Current Procedural Terminology, Fourth Edition (CPT–4),* as maintained and distributed by the American Medical Association, for physician services and other health care services. These services include, but are not limited to, the following: (i) Physician services. (ii) Physical and occupational therapy services. (iii) Radiologic procedures. (iv) Clinical laboratory tests. (v) Other medical diagnostic procedures. (vi) Hearing and vision services. (vii) Transportation services including ambulance.
(iii) Laboratory orders and results	
(A) Standard. Logical Observation Identifiers Names and Codes (LOINC®) version 2.27, when such codes were received within an electronic transaction from a laboratory (incorporated by reference in §170.299).	
(B) [Reserved]	
(iv)Medication list.	

§170.205 Content exchange and vocabulary standards for exchanging electronic health information.	Regulatory Referenced Standard
(A) Standard. Any code set by an RxNorm drug data source provider that is identified by the United States National Library of Medicine as being a complete data set integrated within RxNorm.	Federal Register January 13, 2010 page 2031 footnote #17: GS - 10/01/2009 (Gold Standard Alchemy); MDDB - 10/07/2009 (Master Drug Data Base. Medi-Span, adivision of Wolters Kluwer Health); MMSL - 10/01/2009 (Multum MediSource Lexicon); MMX - 09/28/2009 (Micromedex DRUGDEX); MSH - 08/17/2009 (Medical Subject Headings (MeSH));MTHFDA - 8/28/2009 (FDA National Drug Code Directory); MTHSPL - 10/28/2009 (FDA StructuredProduct Labels); NDDF - 10/02/2009 (First DataBank NDDF Plus Source Vocabulary); SNOMED CT - 07/31/2009 (SNOMED Clinical Terms (drug information) SNOMED International); VANDF - 10/07/2009 (Veterans Health Administration National Drug File).
(B) [Reserved]	

NORMATIVE TEST PROCEDURES

Derived Test Requirements

DTR170.304.i.1 – 1: Electronically Receive and Display HL7 CCD Patient Summary Record

DTR170.304.i.1 – 2: Electronically Receive and Display ASTM CCR Patient Summary Record

DTR170.304.i.2: Electronically Transmit HL7 CCD or ASTM CCR Patient Summary Record

DTR170.304.i.1 – 1: Electronically Receive and Display HL7 CCD Patient Summary Record

Required Vendor Information

VE170.304.i.1 - 1.01: Vendor shall provide communications configuration information and patient identifiers necessary to send test patient summary records in HL7 CCD format to the EHR. Vendor shall specify whether they wish to receive an HL7 CDA level 2 or level 3 CCD.

VE170.304.i.1 - 1.02: Vendor shall identify the EHR function(s) that are available to view an HL7 CCD formatted patient summary record in human readable format when received from an external source

VE170.304.i.1 - 1.03: Vendor shall identify the RxNorm-mapped medications vocabulary implemented within the EHR

Required Test Procedure

TE170.304.i.1 - 1.01: Tester shall select patient summary record data from NIST-supplied test data sets

TE170.304.i.1 - 1.02: Tester shall transmit the patient summary record in the Vendor-selected HL7 CCD format (CDA level 2 or 3) to the EHR

TE170.304.i.1 - 1.03: Using the EHR function(s) identified by the Vendor and the NIST-supplied Inspection Test Guide, the Tester shall display and verify that the patient summary record test data are received in the EHR, including

- Diagnostic test results
- Problem list
- Medication list
- Medication allergy list
- Immunization list
- Procedure list

Inspection Test Guide

IN170.304.i.1 - 1.01: Tester shall verify that the patient summary record test data are received by the EHR

IN170.304.i.1 - 1.02: Tester shall verify that the received patient summary record test data are complete, correct and viewable in the EHR in human readable format, and that the received test data are conformant to the referenced content and vocabulary standards including:

- Structured data (XML) are presented to the user in narrative English language description form.
- Diagnostic test results including the appropriate LOINC standard text for any lab results containing LOINC codes
- Problem list including the appropriate ICD-9-CM or SNOMED-CT standard text for any problems containing ICD-9-CM or SNOMED-CT codes
- Medication list including the appropriate medications vocabulary text based on the list of codes supplied by the Vendor in VE304.i.1 - 1.03
- Medication allergy list (there is no requirement for allergy coded values to transmitted)
- Immunization list including the appropriate CVX standardized text for any immunizations containing CVX codes
- Procedure list including the appropriate ICD-9-CM or HCPCS standard text for any procedures containing ICD-9-CM or HCPCS codes

DTR170.304.i.1 – 2: Electronically Receive and Display ASTM CCR Patient Summary Record

Required Vendor Information

VE170.304.i.1 - 2.01: Vendor shall provide communications configuration information and patient identifiers necessary to send test patient summary records in ASTM CCR format to the EHR.

VE170.304.i.1 - 2.02: Vendor shall identify the EHR function(s) that are available to view an ASTM CCR formatted patient summary record in human readable format when received from an external source

VE170.304.i.1 - 2.03: Vendor shall identify the RxNorm-mapped medications vocabulary implemented within the EHR

Required Test Procedure

TE170.304.i.1 - 2.01: Tester shall select patient summary record data from NIST-supplied test data sets

TE170.304.i.1 - 2.02: Tester shall transmit the patient summary record in ASTM CCR format to the EHR

TE170.304.i.1 - 2.03: Using the EHR function(s) identified by the Vendor and the NIST-supplied Inspection Test Guide, the Tester shall display and verify that the patient summary record test data are received in the EHR, including

- Diagnostic test results
- Problem list
- Medication list
- Medication allergy list
- Immunization list
- Procedure list

Inspection Test Guide

IN170.304.i.1 - 2.01: Tester shall verify that the patient summary record test data are received by the EHR

IN170.304.i.1 - 2.02: Tester shall verify that the received patient summary record test data are complete, correct and viewable in the EHR in human readable format, and that the received test data are conformant to the referenced content and vocabulary standards, including:

- Structured data (XML) are presented to the user in narrative English language description form.
- Diagnostic test results including the appropriate LOINC standard text for any lab results containing LOINC codes
- Problem list including the appropriate ICD-9-CM or SNOMED-CT standard text for any problems containing IDC-9-CM or SNOMED-CT codes
- Medication list including the appropriate medications vocabulary codes based on the list of codes supplied by the Vendor in VE304.i.1 - 1.03
- Medication allergy list (there is no requirement for allergy coded values to transmitted)
- Immunization list including the appropriate CVX standardized text for any immunizations containing CVX codes
- Procedure list including the appropriate ICD-9-CM or HCPCS standard text for any procedures containing ICD-9-CM or HCPCS codes

DTR170.304.i.2: Electronically Transmit HL7 CCD or ASTM CCR Patient Summary Record

Required Vendor Information

VE170.304.i.2 - 01: Vendor shall identify the standard format they will use for this test (CCD or CCR)

VE170.304.i.2 - 02: Vendor shall identify a patient with an existing record in the EHR to be used for this test

VE170.304.i.2 - 03: Vendor shall identify the EHR function(s) available to 1) select the patient, 2) enter patient summary record data into the EHR, 3) transmit patient summary record data from the EHR to an external system in the Vendor-selected format

Required Test Procedures

TE170.304.i.2 - 01: Tester shall select patient summary record test data from NIST-supplied test data sets

TE170.304.i.2 - 02: Using the EHR function(s) identified by the Vendor, the Tester shall select the patient's existing record and enter the patient summary record test data

TE170.304.i.2 - 03: Using the EHR function(s) identified by the Vendor, the Tester shall transmit the patient summary record in the vendor-selected format to a NIST-supplied test tool as described in the Conformance Test Tools section

TE170.304.i.2 - 04: Using the NIST-supplied test tool and the NIST-supplied Inspection Test Guide, the Tester shall verify that the patient summary record test data are transmitted correctly and without omission by the EHR, including

- Diagnostic test results
- Problem list
- Medication list
- Medication allergy list
- Immunization list
- Procedure list

Inspection Test Guide

IN170.304.i.2 - 01: Tester shall verify that the patient summary record test data are entered into the EHR correctly and without omission

IN170.304.i.2 - 02: Tester shall verify that all of the patient summary record test data are stored in the patient's record, including

- Diagnostic test results
- Problems
- Medications
- Medication allergies
- Immunizations
- Procedures

IN170.304.i.2 - 03: Tester shall verify that the patient summary record test data are transmitted by the EHR to the NIST-supplied test tool

IN170.304.i.2 - 04: Tester shall verify that the transmitted patient summary record test data transmitted to the NIST-supplied test tool are complete and correct, and that the received test data are conformant to the referenced content (CCD or CCR) and vocabulary standards including:

- Diagnostic test results including the appropriate LOINC codes for any lab results transmitted
- Problem list including the appropriate ICD-9-CM or SNOMED-CT codes

- Medication list including the appropriate RxNorm medications vocabulary codes Medication allergy list (there is no requirement for allergy coded values to transmitted)
- Immunization list including the appropriate CVX codes
- Procedure list including the appropriate ICD-9-CM or HCPCS codes

EXAMPLE TEST DATA

* indicates alternative standard code per certification criteria

Data Set #1

Patient

Name	Date/Time of Birth	Gender	Identification Number	Identification Number Type	Address/Phone
John D. Smith	07/04/1960 10:15:02	Male	999999999	Medical Record Number	355 Maple Street, Williamsport, Pennsylvania 17701 570-837-8364

Problem List

Type	ICD-9 Code	Patient Problem	Status	Date Diagnosed	Source
Diagnosis	356.4	Idiopathic Peripheral Neuropathy, Progressive	Active	01/24/2010	John Fitzgerald, MD
Diagnosis	250.02	Diabetes Mellitus, Type 2	Active	09/16/2009	John Fitzgerald, MD
Condition	272.4	Hyperlipidemia	Active	05/05/2002	John Fitzgerald, MD
Finding	414.01	Coronary Artery Disease (CAD)	Chronic	05/05/2002	John Fitzgerald, MD
Symptom	401.9	Hypertension, Essential	Active	05/05/2002	John Fitzgerald, MD

Type	SNOMED Code*	Patient Problem	Status	Date Diagnosed	Source
Disorder	22722001	Idiopathic Peripheral Neuropathy	Active	01/24/2010	John Fitzgerald, MD
Disorder	44054006	Diabetes Mellitus, Type 2	Active	09/16/2009	John Fitzgerald, MD
Disorder	55822004	Hyperlipidemia	Active	05/05/2002	John Fitzgerald, MD
Disorder	53741008	Coronary Arteriosclerosis	Chronic	05/05/2002	John Fitzgerald, MD
Disorder	59621000	Essential Hypertension	Active	05/05/2002	John Fitzgerald, MD

Medication List

RxNorm Code	Product	Generic Name	Brand Name	Strength	Dose	Route	Frequency	Date Started	Status	Source
205875	Medication	glyburide	Diabeta	2.5 mg	1 Tablet	PO	Q AM	09/16/2009	Active	John Fitzgerald, MD
617314	Medication	atorvastatin calcium	Lipitor	10 mg	1 Tablet	PO	Q Day	05/05/2002	Active	John Fitzgerald, MD
200801	Medication	furosemide	Lasix	20 mg	1 Tablet	PO	BID	05/05/2002	Active	John Fitzgerald, MD
628958	Medication	potassium chloride	Klor-Con	10 mEq	1 Tablet	PO	BID	05/05/2002	Active	John Fitzgerald, MD

Medication Allergy List

Type	SNOMED Code	Medication/Agent	Reaction	Date Identified	Source
Drug Allergy	293597001	Codeine	Hives	06/27/1996	John Fitzgerald, MD
Drug Allergy	294506009	Ampicillin	Diarrhea, nausea, vomiting	03/15/1994	John Fitzgerald, MD

Immunization List

Manufacturer	Lot Number	RxNorm Code	CVX Code	Vaccine	Route	Reaction	Date Administered	Source
Novartis	222222	857924	16	Influenza	IM	None	11/16/2009	John Fitzgerald, MD
Merck	887765B	854977	33	PPV	IM	None	9/25/2009	John Fitzgerald, MD

Procedure List

Type	ICD-9 Code	Procedure	Status	Date Performed	Source
Surgical	86.3	Excision of benign lesion on arm	Completed	06/14/2006	John Fitzgerald, MD
Cardiac	00.66	Percutaneous transluminal coronary angioplasty	Completed	10/01/2004	John Fitzgerald, MD

Type	CPT Code*	Procedure	Status	Date Performed	Source
Surgical	11401	Excision of benign lesion on arm	Completed	06/14/2006	John Fitzgerald, MD
Cardiac	92982	Percutaneous transluminal coronary angioplasty	Completed	10/01/2004	John Fitzgerald, MD

Diagnostic Test Results

Type	Code	Test (Normal Range)	Result	Date	Source
Chemistry	14771-0 LOINC	Fasting Blood Glucose (70–100 mg/dl)	178 mg/dl	09/16/2009	John Fitzgerald, MD
Chemistry	14682-9 LOINC	Creatinine (0.5–1.4 mg/dl)	1.0 mg/dl	09/16/2009	John Fitzgerald, MD
Chemistry	14937-7 LOINC	BUN (7–30 mg/dl)	18 mg/dl	09/16/2009	John Fitzgerald, MD
Chemistry	2951-2 LOINC	Sodium (135–146 mg/dl)	141 mg/dl	09/16/2009	John Fitzgerald, MD
Chemistry	2823-3 LOINC	Potassium (3.5–5.3 mg/dl)	4.3 mg/dl	09/16/2009	John Fitzgerald, MD
Chemistry	14647-2 LOINC	Total cholesterol (<200 mg/dl)	162 mg/dl	09/16/2009	John Fitzgerald, MD
Chemistry	14646-4 LOINC	HDL cholesterol (≥40 mg/dl)	43 mg/dl	09/16/2009	John Fitzgerald, MD
Chemistry	2089-1 LOINC	LDL cholesterol (<100 mg/dl)	84 mg/dl	09/16/2009	John Fitzgerald, MD
Chemistry	14927-8 LOINC	Triglycerides (<150 mg/dl)	177 mg/dl	09/16/2009	John Fitzgerald, MD
Imaging	87.44 ICD-9 71010 CPT-4*	Chest X-ray, PA	No disease is seen in the lung fields or pleura	09/16/2009	John Fitzgerald, MD

Data Set #2

Patient

Name	Date/Time of Birth	Gender	Identification Number	Identification Number Type	Address/Phone
Ralph Johnson	06/28/1984 13:20:10	Male	9813466798	Medical Record Number	355 Elm Street, Morton, Illinois 61550 309-377-8365

Problem List

Type	ICD-9 Code	Patient Problem	Status	Date Diagnosed	Source
Diagnosis	493.00	Asthma, unspecified	Active	12/22/2009	Carl Roberts, MD
Diagnosis	250.02	Diabetes Mellitus, Type 2	Active	08/10/2008	Carl Roberts, MD

Type	SNOMED Code*	Patient Problem	Status	Date Diagnosed	Source
Disorder	195967001	Asthma	Active	12/22/2009	Carl Roberts, MD
Disorder	44054006	Diabetes Mellitus, Type 2	Active	08/10/2008	Carl Roberts, MD

Medication List

RxNorm Code	Product	Generic Name	Brand Name	Strength	Dose	Route	Frequency	Date Started	Status	Source
206833	Medication	metaproterenol sulfate	Alupent Inhalation Aerosol	15 mg/ml	2 Puffs	Inhaled	Q4h	02/22/2010	Active	Carl Roberts, MD
205875	Medication	glyburide	Diabeta	2.5 mg	1 Tablet	po	Q AM	08/1020/08	Active	Carl Roberts, MD

Medication Allergy List

Type	SNOMED Code	Medication/Agent	Reaction	Date Identified	Source
Drug Allergy	91936005	Penicillin	Rash and anaphylaxis	08/10/2008	Carl Roberts, MD
Drug Allergy	293620004	Indomethacin	Nausea, vomiting, rash, dizziness, headache	03/25/2003	Carl Roberts, MD

Immunization List

Manufacturer	Lot Number	RxNorm Code	CVX Code	Vaccine	Route	Reaction	Date Administered	Source
Novartis	U6007	857924	16	Influenza	IM	None	10/12/2009	Carl Roberts, MD
GLAXOSMITHKLINE	HAB98V1	798424	43	Hepatitis B	IM	None	09/20/2009	Carl Roberts, MD

Procedure List

Type	ICD-9 Code	Procedure	Status	Date Performed	Source
Surgical	47.09	Emergency Appendectomy	Completed	03/15/2002	Carl Roberts, MD
Surgical	86.59	Suture of scalp laceration	Completed	08/02/2001	Carl Roberts, MD

Type	CPT Code*	Procedure	Status	Date Performed	Source
Surgical	44950	Emergency Appendectomy	Completed	03/15/2002	Carl Roberts, MD
Surgical	12001	Suture of scalp laceration	Completed	08/02/2001	Carl Roberts, MD

Diagnostic Test Results

Type	Code	Test (Normal Range)	Result	Date	Source
Imaging	87.44 ICD-9 71010 CPT-4*	Chest X-ray, PA	Increased bronchial wall markings, patchy infiltrates	02/16/2010	Carl Roberts, MD
Chemistry	14771-0 LOINC	Fasting Blood Glucose (70–100 mg/dl)	70 mg/dl	12/22/2009	Carl Roberts, MD
Hematology	26449-9 LOINC	Eosinophil Count (1 – 3 %)	2%	12/22/2009	Carl Roberts, MD
Imaging	87.44 ICD-9 71010 CPT-4*	Chest X-ray, PA	Bronchial wall markings	12/22/2009	Carl Roberts, MD

Data Set #3

Patient

Name	Date/Time of Birth	Gender	Identification Number	Identification Number Type	Address/Phone
Jane Andrews	05/12/1955 09:30:15	Female	9639275266	Medical Record Number	355 1st Street, Fargo, North Dakota 54102 701-366-8364

Problem List

Type	ICD-9 Code	Patient Problem	Status	Date Diagnosed	Source
Diagnosis	486	Pneumonia	Resolved	01/22/2010	Robert James, MD
Diagnosis	496.0	Chronic Obstructive Pulmonary Disease	Chronic	10/10/1999	Robert James, MD

Type	SNOMED Code*	Patient Problem	Status	Date Diagnosed	Source
Disorder	233604007	Pneumonia	Resolved	01/22/2010	Robert James, MD
Disorder	13645005	Chronic Obstructive Lung Disease	Chronic	10/10/1999	Robert James, MD

Medication List

RxNorm Code	Product	Generic Name	Brand Name	Strength	Dose	Route	Frequency	Date Started	Status	Source
308460	Medication	azithromycin	Azithromycin	250 mg	1 Tablet	PO	QD	01/22/2010	No Longer Active	Robert James, MD
836370	Medication	ipratropium bromide monhydrate	Atrovent Inhaler	18 mcg/puff	2 Puffs	Inhaled	QID	10/10/1999	Active	Robert James, MD
630208	Medication	albuterol sulfate	Albuterol Inhaler	2.5 mg/3ml	2 Puffs	Inhaled	Q 4 hours as needed	10/10/1999	Active	Robert James, MD

Medication Allergy List

Type	SNOMED Code	Medication/Agent	Reaction	Date Identified	Source
Drug Allergy	91936005	Penicillin	Rash and anaphylaxis	06/10/2009	Robert James, MD
Drug Allergy	91939003	Sulfonamides	Hives, photosensitivity	04/25/1988	Robert James, MD

Immunization List

Manufacturer	Lot Number	RxNorm Code	CVX Code	Vaccine	Route	Reaction	Date Administered	Source
Novartis	U6007C	857924	16	Influenza	IM	None	10/15/2009	Robert James, MD
Merck	W1445BB	347699	32	Meningococcal, NOS	IM	None	02/25/2008	Robert James, MD

Procedure List

Type	ICD-9 Code	Procedure	Status	Date Performed	Source
Surgical	81.51	Total Hip Replacement	Completed	06/15/1999	Robert James, MD

Type	CPT Code	Procedure	Status	Date Performed	Source
Surgical	27130	Total Hip Replacement	Completed	06/15/1999	Robert James, MD

Diagnostic Test Results

Type	Code	Test (Normal Range)	Result	Date	Source
Imaging	87.44 ICD-9 71020 CPT-4*	Chest X-ray, PA & Lateral	Hyperinflated lungs with flattened diaphragm and central pulmonary artery enlargement	02/15/2010	Robert James, MD
Hematology	718-7 LOINC	Hemoglobin (male: 14-18 g/dl female: 12-16 g/dl)	16 g/dl	12/22/09	Robert James, MD
Hematology	4544-3 LOINC	Hematocrit (male: 40-54% female: 36-48%)	45%	12/22/09	Robert James, MD

Type	Code	Test (Normal Range)	Result	Date	Source
Cardiology	89.52 ICD-9 93000 CPT-4*	Electrocardiogram	Normal Sinus Rhythm	12/22/09	Robert James, MD

Data Set #4

Patient

Name	Date/Time of Birth	Gender	Identification Number	Identification Number Type	Address/Phone
Sally Eckerd	08/08/1962 18:25:59	Female	998877799	Medical Record Number	754 Samuel Street, Shawville, Pennsylvania 16873 814-645-2981

Problem List

Type	ICD-9 Code	Patient Problem	Status	Date Diagnosed	Source
Condition	272.4	Hyperlipidemia	Active	07/05/2006	Mark Payne, MD
Symptom	401.9	Hypertension, Essential	Active	07/05/2006	Mark Payne, MD

Type	SNOMED Code*	Patient Problem	Status	Date Diagnosed	Source
Disorder	55822004	Hyperlipidemia	Active	07/05/2006	Mark Payne, MD
Disorder	59621000	Essential Hypertension	Active	07/05/2006	Mark Payne, MD

Medication List

RxNorm Code	Product	Generic Name	Brand Name	Strength	Dose	Route	Frequency	Date Started	Status	Source
617314	Medication	atorvastatin calcium	Lipitor	10 mg	1 Tablet	PO	Q Day	07/05/2006	Active	Mark Payne, MD
200801	Medication	furosemide	Lasix	20 mg	1 Tablet	PO	BID	07/05/2006	Active	Mark Payne, MD
628958	Medication	(potassium chloride	Klor-Con	10 mEq	1 Tablet	PO	BID	07/05/2006	Active	Mark Payne, MD

Medication Allergy List

Type	SNOMED Code	Medication/Agent	Reaction	Date Identified	Source
Drug Allergy	91936005	Penicillin	Rash and anaphylaxis	05/22/1998	Mark Payne, MD
Drug Allergy	293597001	Codeine	Hives	02/17/1992	Mark Payne, MD

Immunization List

Manufacturer	Lot Number	RxNorm Code	CVX Code	Vaccine	Route	Reaction	Date Administered	Source
Novartis	222222	857924	16	Influenza	IM	None	11/11/2009	Mark Payne, MD
Merck	887765B	854977	33	PPV	IM	None	09/05/2009	Mark Payne, MD

Procedure List

Type	ICD-9 Code	Procedure	Status	Date Performed	Source
Cardiac	00.66	Percutaneous transluminal coronary angioplasty	Completed	09/1/2006	Mark Payne, MD

Type	CPT Code*	Procedure	Status	Date Performed	Source
Cardiac	92982	Percutaneous transluminal coronary angioplasty	Completed	09/1/2006	Mark Payne, MD

Diagnostic Test Results

Type	Code	Test (Normal Range)	Result	Date	Source
Chemistry	2823-3 LOINC	Potassium (3.5–5.3 mg/dl)	4.5 mg/dl	07/15/2009	Mark Payne, MD
Chemistry	14647-2 LOINC	Total cholesterol (<200 mg/dl)	180 mg/dl	07/15/2009	Mark Payne, MD
Chemistry	14646-4 LOINC	HDL cholesterol (≥40 mg/dl)	38 mg/dl	07/15/2009	Mark Payne, MD
Chemistry	2089-1 LOINC	LDL cholesterol (<100 mg/dl)	120 mg/dl	07/15/2009	Mark Payne, MD
Chemistry	14927-8 LOINC	Triglycerides (<150 mg/dl)	187 mg/dl	07/15/2009	Mark Payne, MD

Type	Code	Test (Normal Range)	Result	Date	Source
Imaging	87.44 ICD-9 71020 CPT-4*	Chest X-ray, PA & Lateral	The heart outline is normal and the hilar and mediastinal vessels are of normal appearance	07/15/2009	Mark Payne, MD

Data Set #5

Patient

Name	Date/Time of Birth	Gender	Identification Number	Identification Number Type	Address/Phone
Matthew Brown	09/22/1965 16:48:25	Male	988730987	Medical Record Number	754 Sharp Street, Aurora, Colorado 80011 303-544-9988

Problem List

Type	ICD-9 Code	Patient Problem	Status	Date Diagnosed	Source
Diagnosis	250.02	Diabetes Mellitus, Type 2	Active	07/17/2009	Pamela Jones, MD
Symptom	401.9	Hypertension, Essential	Active	06/05/2008	Pamela Jones, MD

Type	SNOMED Code*	Patient Problem	Status	Date Diagnosed	Source
Disorder	44054006	Diabetes Mellitus, Type 2	Active	07/17/2009	Pamela Jones, MD
Disorder	59621000	Essential Hypertension	Active	06/05/2008	Pamela Jones, MD

Medication List

RxNorm Code	Product	Generic Name	Brand Name	Strength	Dose	Route	Frequency	Date Started	Status	Source
205875	Medication	glyburide	Diabeta	2.5 mg	1 Tablet	PO	Q AM	07/17/2009	Active	Pamela Jones, MD
200801	Medication	furosemide	Lasix	20 mg	1 Tablet	PO	BID	06/05/2008	Active	Pamela Jones, MD
628958	Medication	potassium chloride	Klor-Con	10 mEq	1 Tablet	PO	BID	06/05/2008	Active	Pamela Jones, MD

Medication Allergy List

Type	SNOMED Code	Medication/Agent	Reaction	Date Identified	Source
Drug Allergy	294506009	Ampicillin	Diarrhea, nausea, vomiting	03/25/1997	Pamela Jones, MD
Drug Allergy	91939003	Sulfonamides	Hives, photosensitivity	04/25/1989	Pamela Jones, MD

Immunization List

Manufacturer	Lot Number	RxNorm Code	CVX Code	Vaccine	Route	Reaction	Date Administered	Source
Merck	887765B	854977	33	Pneumococcal	IM	None	11/13/2009	Pamela Jones, MD
GLAXOSMITHKLINE	HAB98V1	798424	43	Hepatitis B	IM	None	09/15/2009	Pamela Jones, MD

Procedure List

Type	ICD-9 Code	Procedure	Status	Date Performed	Source
Surgical	81.51	Total Hip Replacement	Completed	06/15/2001	Pamela Jones, MD
Surgical	86.3	Excision of benign lesion on arm	Completed	10/20/1999	Pamela Jones, MD

Type	CPT Code	Procedure	Status	Date Performed	Source
Surgical	27130	Total Hip Replacement	Completed	06/15/2001	Pamela Jones, MD
Surgical	11401	Excision of benign lesion on arm	Completed	10/20/1999	Pamela Jones, MD

Diagnostic Test Results

Type	Code	Test (Normal Range)	Result	Date	Source
Chemistry	14771-0 LOINC	Fasting Blood Glucose (70–100 mg/dl)	145 mg/dl	07/17/2009	John Fitzgerald, MD
Chemistry	2823-3 LOINC	Potassium (3.5–5.3 mg/dl)	4.5 mg/dl	07/17/2009	Pamela Jones, MD
Chemistry	14927-8 LOINC	Triglycerides (<150 mg/dl)	187 mg/dl	07/17/2009	Pamela Jones, MD
Imaging	87.44 ICD-9 71020 CPT-4*	Chest X-ray, PA & Lateral	The heart outline is normal and the hilar and mediastinal vessels are of normal appearance	07/17/2009	Pamela Jones, MD

CONFORMANCE TEST TOOLS

The following testing tools are available to evaluate conformance to the standards referenced in this test procedure:

- HL7 CCD – NIST provides an HL7 CCD validation tool designed specifically to support ARRA Meaningful Use Testing as described in this test procedure. The tool is available in two forms:
  - a downloadable package for local installation available at http://xreg2.nist.gov/cda-validation/mu.html
  - a web-accessable validator which is hosted by NIST available at http://xreg2.nist.gov/cda-validation/mu.html

  Support for these tools is available by contacting
  Andrew McCaffrey (andrew.mccaffrey@nist.gov)
  Computer Scientist
  National Institute of Standards and Technology (NIST)
  Information Technology Laboratory

- ASTM CCR – NIST is actively working with industry to identify available CCR validation tools. The test procedure will be updated as soon as the specific tool has been identified.

- HL7 CCD style sheet – HL7 provides a style sheet to render HL7 CCD structured documents as part of the CCD specifications package. Contact HL7 directly for the specification package.